sPHENIX EMCal Fast Simulation

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Motivation

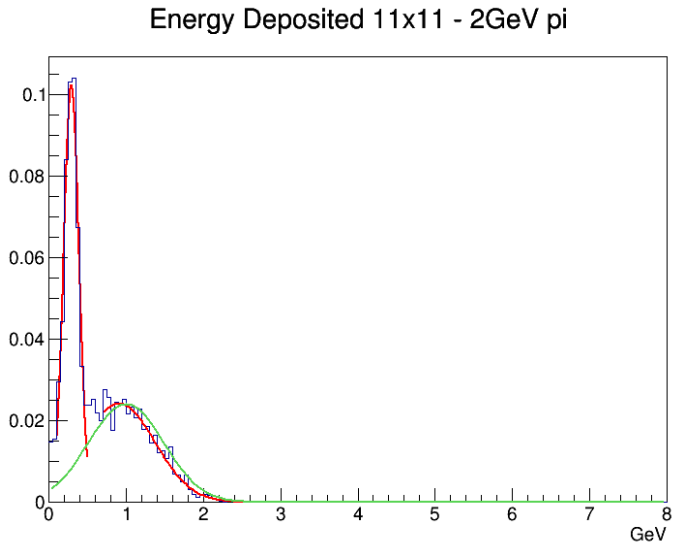
- Interested in how track-EMCal matching would improve electron track purity and identification
- Would like to test different tracker configurations
- Full G4 simulations are time and cpu intensive

→ Fast simulation of EMCal coupled with full G4 simulation of tracking

Setup

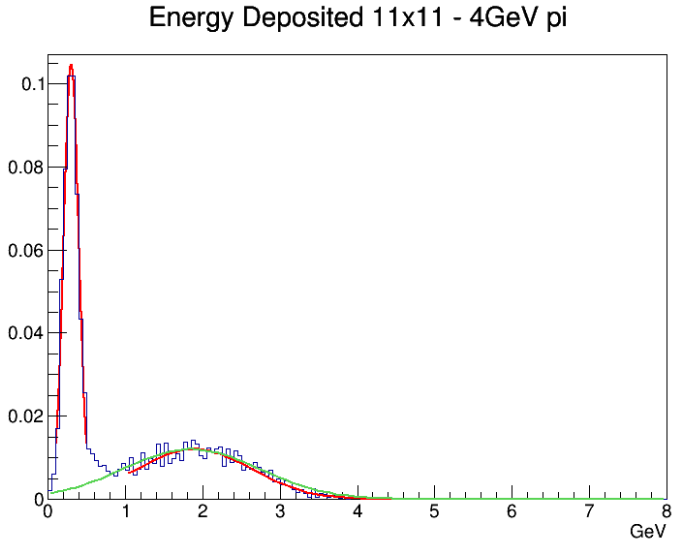
- Fast sim EMCal is “blackhole” cylinder at shower max radius
  - From this G4 gives “truth” kinematic information of particles at the point they hit the cylinder
- Parameterize EMCal response for em and hadronic particles as measured from full G4 simulations
  - EM particle energy resolution and shower shape are well described with simple gaussian parameterizations
  - Hadron behavior is more complicated

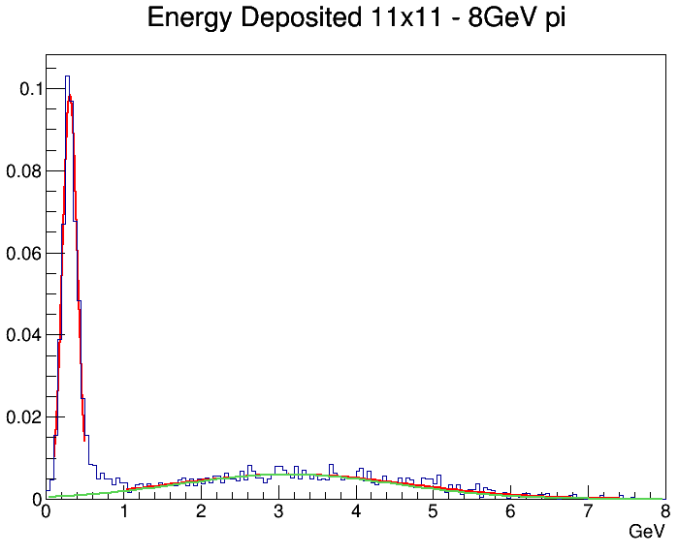
Hadrons in the EMC



Energy distribution can roughly modeled by two gaussians

- one for MIPs (independent of energy)
- another for nuclear interaction



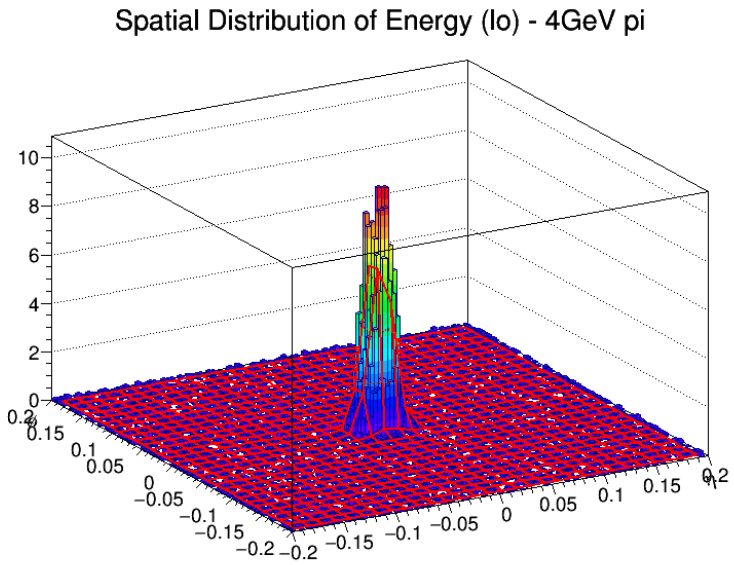


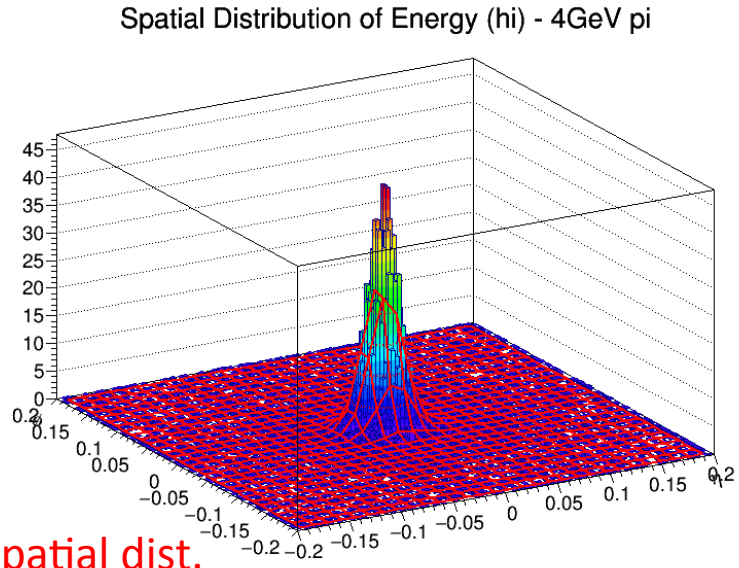
Hadrons in the EMC

Average spatial distribution of shower is not exactly gaussian

This might be good enough for a first pass, but I am looking at some other ideas

MIP spatial dist.





Higher energy spatial dist.

Status

- Already have most of the machinery for this working from previous fast simulation of total calorimeter response to hadrons
- Have implemented the above parameterizations and am currently testing
- Should have results later this week